

## **A Study of Isan and Lao Indigenous Knowledge in Making Bronze and Brass Products for Commercial Purpose**

<sup>1</sup>Niyom Wongpongkam, <sup>1</sup>Songkoon Chantachon and <sup>2</sup>Subunn Ieamvijarn

<sup>1</sup>Research Institute of Northeastern Arts and Culture, Maha Sarakham University,  
Muang District, Maha Sarakham 44000, Thailand

<sup>2</sup>Faculty of Accountancy and Management, Maha Sarakham University,  
Kantharawichai District, Maha Sarakham 44150, Thailand

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**Abstract:** The development and history of Bronze and Brass alloy products in Isan and Lao Region of dates back to Pre-historic age, the historic age and is still evident in modern times. There was no significant relationship between the approach and development of Alloy in ethnic, thought, belief and pattern of the products. But, there was a similarity between the molding processes of replacing wax. There was also significant relationship between in the application of the products usefulness. For the guideline of product development, the try out of new material was used for variety of material color. It was investigated by Spectrometer. As a result, shade color of new material for 24 colors both Bronze and Brass in order to be used in designing the decorative product. For the producing process, new process of production was used. Consequently, it could reduce the steps of production and increase the amount of production more than the former time. For the design aspect, it could be divided into 3 groups: the low swelled sculpture group, the high swelled sculpture group and the floating sculpture group based on thinking basic of design from the Isan and Lao Local Indigenous Knowledge and was relevant to technology progress as follows: The low swelled sculpture product designed from approach of Isan and Lao Kit Cloth, the high swelled product designed from the approach of Heet 12 and the floating product mainly focused on new design for serving the consumer's need.

**Key words:** Indigenous knowledge, alloy, bronze, brass, Isan, northeast Thailand

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### **INTRODUCTION**

According to the historical evidence and archeology, it is believed that the Middle East is the first center and origin of Bronze which dates back more than 5,600 years. Bronze is major factor leading to the development and expansion of copper mines and the creating of manufacturing copper as an industry which gave birth to trade networks, exchange and trade. This eventually led to the invention of instruments, equipment, weapon and decorations which were widely distributed in various communities.

Asia is believed to have inherited Bronze technology from the Middle East in Mesopotamia, which is current day Iraq. As commerce and trade expanded, Bronze technology eventually spread to India, China and to the Northern Vietnam and finally to other areas of South East Asia. Evidence of advanced metal works in Thailand is located only in Northeast region which were recovered from archaeological diggings at the community of Non

Nokta in Khon Kaen Province and at the village of Ban Chieng in Udon Thani Province. Other areas of Thailand only showed evidence of a Stone Age culture in the same period. The Age of soil level where Bronze was found at Ban Chieng site dates to about 4,000-5,600 years ago and the culture was distributed to various parts in the North Eastern Region in Nakhon Phanom Province, Sakon Nakhon Province and Laos. The discovery of a Bronze culture in Northeastern Region and Lao People's Democratic Republic is evidence of the first steps of human development from a gathering and hunting society to an agricultural community with the creation of agricultural tools made from Brass and Bronze. This development laid the foundation leading to an industrial society which gave birth to Northeast Thailand's Iron Age (Tongprasert, 1987).

The pattern of Bronze products in Isan or the North Eastern Thailand and Lao People's Democratic Republic in the earlier Ages reflected the beliefs or customs which were also dedicated to honor the deceased. Many

Bronze items such as axe, bowls and spears accompanied burials. Decorative metal products and ornaments belonging to the deceased were also buried with them. Products such as bracelets, ear rings and rings were common artifacts recovered from burial sites. As the society progressed, it is believed that Bronze technology was later applied to making tools and utensils. More and more items made of Bronze were preferred. Various kinds of products from small sized factories were used to produce small decorations and small sized equipments which finally developed to form medium and large industries. The larger products were soon refined with greater detail into beautiful products such as Buddha images, statues and large items which have been passed on from generation to generation up to modern times (Sittitanyakit, 2004).

There is strong evidence of a flourishing Bronze Age community in Northeast Thailand but is noticeable that the area lacked Tin. There is currently no evidence of Tin mining in Northeast Thailand, but Tin exists in others areas such as Myanmar, Southern Provinces in Thailand and in the provinces of Uthai Thani, Chainat, Supanburi, Ganjana Buri and Pechburi Provinces in Central Thailand, in the Northern Region was found at Kampanget, Tak, Chiangmai, Chiangrai and Mae Hongson Provinces. In the Eastern Region, it was found at Chonburi, Rayong and Chantaburi Provinces. It is hypothesized that the Tin was imported into the North Eastern Region from surrounding areas and also from the Lao People's Democratic Republic near Vientiane City.

There is no conclusion in modern times to Bronze production process on the relationship to the origin of the technology if it transcended from the Metal Age or from the Prehistoric period. There are differences in the pattern of the products and the influence of ethnic identities and the indigenous knowledge applied to the production is still uncertain.

Brass is an alloy made from copper and 3-5% of Zinc. Evidence in the late Bronze Age was found that that Brass was used to make equipments, utensils and decorations approximately 2,400 years ago. Evidence of the use of Zinc was also evident 2,700 years ago in several regions of Central Asia, South East Asia and in several areas of Thailand. But, no evidence was found linking to North Eastern Thailand Region and Lao People's Democratic Republic (Wallipokom, 2005).

The study of alloy in Isan or the North Eastern Thailand and Lao People's Democratic Republic is not a new topic and has been studied by other researchers before. There were systematic studies especially in the development of Bronze and Brass. But past research studies was only limited in the field of archeologist, art

historians and human development. The main objective of past researches was to find the answer of the source for making the alloy with no regards to the indigenous knowledge such as material selection, production process, patterns and commercial development of the items. Bronze and Brass were the clearest evidence of the valuable history, culture and indigenous knowledge in Northeast Thailand and Laos. The thinking process in cleverly performing alchemy of the North Eastern People and Laotians as well as clear Local Indigenous Knowledge in producing and designing product by bringing the motto, belief, for combining with thinking technique of utility became the pattern reflecting the state of being North Eastern People and Laotians clearly. They were the products showing the local technological progress especially bringing material from nature in locality such as soil and termite hill mixing with buffalo dung to make the mold fire durable material to 1,000° as well as the Local Indigenous Knowledge in designing the product wasn't made to serve the needs and utility only. But, it was a valuable work of art which was practical in the field of product design.

There were many sources of producing Bronze and Brass Alloy in modern times. The locations and centers are scattered throughout Northeast Thailand. But the most important sites which contained evidence of the production process and specific patterns are located at Banpa-aw village located at Muang District in Ubon Rachathani Province, Banbing village located at Chokchai District in Nakhon Rachasima Province, Banlomkom village located in Pol District at Khon Kaen Province, Bannasamire village located in Yasotorn Province, Jaturapakpiman District, Roi et Province and Ban Huakua village in Kosumpisai District at Mahasarakham Province, Thailand. In Lao People's Democratic Republic there showed evidence of producing Bronze and Brass in the city of Vientiane.

According to the rational and importance as the above, the researcher is interested in studying local Indigenous Knowledge of the North Eastern Region and Lao in producing Bronze and Brass for developing additional commercial value based on thinking basis and Local Indigenous Knowledge as well as integrating with new ideas to be congruent with the needs of community and consumer in the future.

## **MATERIALS AND METHODS**

This research was qualitative research. Field data gathering was conducted in 6 Provinces in the North Eastern Region of Thailand and the City of Vientiane in Lao People's Republic according to objective of research

for the issues of historical background, indigenous knowledge of alloy metal products and study into creating guidelines of development for adding commercial value to locally produced alloy products using local indigenous knowledge in Northeast Thailand. The data was collected by using interviewing techniques of both in Structured and Non-structured Interviews, Participant and Non-participant Observation, focus group discussion and workshops.

To study the history and development of Bronze and Brass products and to study the development of Bronze and Brass product to increase the trading value.

## **RESULTS AND DISCUSSION**

According to the studies, found that the metal molding started the development from Bronze Age which was approximately 4,000 years ago. It began from finding pure metals such as gold, silver and copper. Then humans started to know other kinds of metals such as Tin and Zinc. Those kinds of metal were brought for mixing until it became Alloy for the first time in the world which was called Tin Bronze. It was the first kind of Alloy invented by humans. Moreover, it was very useful for designing products. It made changes in lifestyle and reformed the daily life equipment very much. It could be said that Tin Bronze was the metal that changed the world. The development of Brass (the Alloy between Copper and Zinc) which was another kind of Alloy continued development until modern times. It became the popular metal both in small sized industry in the household and in large sized industry. Its price was not too expensive nearly the same as iron. But, it was more beautiful.

For the producing process of Alloy, it developed from humans who combined pure metal like gold, silver and copper using as decoration and equipment by the process of hammering, pressing and tapping in order to make a simple shape. It was called Formation by Cold Hammering. Later on, heat was brought in addition with hammering, pressing and tapping. It was called Heat Treatments. It started to enter to the molding process with heat in later time. For the first periods of molding, the simple molds made from stone or sand. The mold was directly applied to the model or pattern or "molding the raw pattern". This process of molding was used until the knowledge of using wax as a model replacement was used. The wax was then replaced by metal. It was called "the Wax Replacement or Lost Wax" method which was high technology technique which was appropriate with delicate and refined works of art. But, its steps were complex and time consuming to produce large quantities.

When the small foundries became large industries, the techniques of reducing the process was searched and developed in order to make it be easier and use the least amount of time. The search for a better technique created the process of using sand molds. It was a simple process, but by spending the little amount of time to make the mold but the process was capable of producing a lot of work pieces. The negative of using sand molds was that it was only appropriate with simple pattern products that didn't have too much detail.

The product of the first metal period or Prehistoric Age were items made for serving daily life such as ornaments simple tools and equipments. Then they were developed to making religious items and ritual tools because Bronze and Brass was an expensive metal. For daily life equipments, copper was used instead because it was more durable and cheaper.

For Local Indigenous Knowledge, found that the Local Indigenous Knowledge for producing the Alloy of Bronze and Brass product could be concluded into 3 aspects: The Local Indigenous Knowledge for selecting natural material in locality by applying animal dung, soil, termite hill, paddy husk in producing process. The Local Indigenous Knowledge in production process in the North Eastern Region, it still conserved the ancient producing process especially at the village of Banpa-aw, Ubon Rachathani Province while at Vientiane City it was not performed. The local indigenous knowledge appearing in distinct product patterns.

For the product development, the researcher brought information from interviewing, observing, focus group discussion and workshop with the specialists. The product pattern development under the conceptual framework was concluded as follows: Clear expression of being the North Eastern. The material included variety of colors. The specialists from locality could perform without difficulty, the producing process was conservative style, some parts might be applied for appropriateness. The pattern of products had to be various for adding to other kinds of products. Must be beautiful and very useful. The cost of producing was relevant to economic and value of work. Then they were designed for 3 kinds of product: Low convex sculpture, High convex sculpture and floating sculpture.

For the content value, the lifestyle of Isan and Lao was the conceptual framework in designing such as the Traditional Isan Kit Cloth and Heet 12 or 12 months traditions. The pattern of traditional Kit Cloth and Heet 12 were reflective picture of Local Indigenous Knowledge, viewpoint and the unique identity of Isan and Lao People's Democratic Republic communities.

The community at Ban Chiang village was the most ancient civilization in the metal and Bronze Age. Ban Chiang village was a model of the most ancient civilization in Southeast Asia. Historical evidence at Ban Chiang village in Udon Thani Province in Northeast Thailand yield evidence of being the center and origin of Brass and Bronze in Southeast Asia. The technology later was introduced to other regions and communities such as at Banommuang village in Khon Kaen Province and at Ban Prasart village in the province of Nakhon Ratchasima Province.

The production of Bronze and Brass Alloy are the ongoing development of metal works which was initiated by the knowledge obtained from smelting simple metals which were accidentally discovered in stone and minerals. It is hypothesized that the discovery of copper and pure minerals occurred by chance and the process of smelting soon developed into making Alloy. During Bronze age in Northeast Thailand there also exists evidence of smelting copper, gold silver and lead which were important minerals that were also transformed into useful items.

Production process slowly advanced from differentiating pure metals from minerals and stones and formed by simple process such as cold hammering, pressing and tapping pure minerals into useful tools and household items used in every day life. As technology and techniques advanced, it created more ways to form products by using advanced methods such as heat treatment, hot pressing and the use of molds. These new techniques, especially using molds required more complex procedures and eventually refined into the wax replacing method.

The relationship of history and the development of the Alloy of Bronze and Brass during the Prehistoric Age at Ban Chiang village in Udon Thani Province and at Ubon Rachathani Province in the same period only showed similarity in the production process by using wax replacement mold only. There was no relationship in race, ethnic, language, religion and culture because there is no obvious evidence recovered at excavations which could indicate who the Ban Chiang people are, where they came from or where they disappeared to. The current residents of Ban Chiang are ethnic Thai Puan who migrated from Chiang Kwang city in 1817.

The indigenous knowledge used in producing the metal products is clearly shown in the selection of natural materials within the area and the pattern of the product. Selecting natural materials in locality showed the dependency between humans and nature which contributed to the process as a cultural cost. Cultural cost is the development of cultural intellect or indigenous knowledge of using natural resources. The use of natural

materials was a clever human technique clearly expressing the intellect and the knowledge of gathering resources (Boonnotok, 1998). However, the use of natural material alone wasn't long lasting and was soon accompanied by synthesized materials. The progress of technology and the knowledge of producing Alloy soon paved the way to the production of synthesized materials. Synthesized materials such as plaster, artificial sand mixes and artificial wax was used and in some cases replaced natural materials, such as termite mound dirt, paddy husks, water buffalo manure and natural wax. The cultural ecology was an adaptation or relationship between culture and environment. The natural environment affected the differences of cultural adaptation. The cultural development would slowly change among various factors or external variables including natural environment.

The local indigenous knowledge of producing process and local indigenous knowledge appearing in product pattern of Isan people and Laos besides the thinking technique showing sharp Local Indigenous Knowledge in applying natural material in locality, they also knew how to select and adapt natural raw material in changing characteristic to be relevant to modern technological progress such as bringing material like bull's chit mixing with soil or paddy husk in adequate proportion. The process of wax pressing was a local technology showing that they know how to bring raw material in locality for beneficial usefulness as well as hammer the stripe by simple innovation by using natural product in locality for usefulness especially the process of producing the Lost Wax or Replaced Wax Replacement was the technique reflecting high technology Local Indigenous Knowledge of Isan people and Laotians. The technological progress of Isan people and Laotians existed in Bronze Age whereas other regions in Thailand were still in Stone Age. This phenomenon was relevant to the theoretical approach of Julian Steward of that the culture was instrument for humans' adaptation and viewing that the study of culture and Local Indigenous Knowledge occurred from 3 basic factors: The relationship between cultural technology and environment. The efficiency of culture had to be analyzed which could bring resource for the most beneficial use. The behavioral pattern showed relationship between technology and culture by analyzing from humans in each society for creating culture in determining various behaviors and activities as well as working techniques for survival. The last thing including the relationship between pattern and culture was the analysis of behavior and activity in society that whether it affected the survival of society.

The Local Indigenous Knowledge existing in the pattern of product found that there was technique of

presenting beauty in idealism focusing on usefulness rather than presenting beauty. It was the work made for serving lifestyle of local people as major thing. It was valuable in thinking, beautiful capability, not extravagance that the art work of Isan people and Laotians always showed philosophy and spirit very clearly as know to be, know to have, know to be good and know to be sufficient. It was believed that the art work was valuable in itself without depending on outside reference. The beauty value based on only the art principle occurred in the art work itself (Srisuro, 1993).

Later on, the pattern was developed from the technological progress in order to adjust the pattern for being able to serve human's needs and be more relevant to recent lifestyle. Such phenomenon was relevant to Innovation Theory that exposing new things or accepting new things referred to the acceptance of technological objects and non objects including feeling, thought, attitude and ideal. The new things consisted of 3 sources: the first source was Discovery. The second source was Invention. The third source was Diffusion.

The guidelines of producing product of Alloy of Bronze and Brass by designing product that could serve the needs of market, consumer, lifestyle, mental beauty but still based on Local Indigenous Knowledge had to show identity of Local Indigenous Knowledge produced by local people which it had to reflect identity of that locality so that it was truly a valuable design in Local Indigenous Knowledge (Srisuro, 1993). The design of this research was truly valuable product in Local Indigenous Knowledge and took the role as central media between producers as people in locality and consumer as Isan People and Laos. Therefore, the consideration of work performance was performed according to level of art that develop satisfaction or a feeling of consumer or efficiency

of art work in providing knowledge material for the audiences. So, it could be used as rational or guideline in evaluating value of art work in future opportunity that there were 2 kinds of design: the first kind, the design for using and design for beauty especially the design focusing on mental usefulness was valuable design in abstract which was difficult to be touched. But, it was the design that could easily access to viewpoint and Local Indigenous Knowledge of designers (Tangcharoen, 2008).

## CONCLUSION

As a result, the consumers were happy and satisfied in this kind of design, including the design of painting, sculpture, as well as decorations such as interior design inside buildings and outside building etc.

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